

REMARKS

The Abstract of the Disclosure has been amended. Claims 1, 2, 5, 6, 9-12, and 16-18 have been amended. No new matter has been introduced by these amendments. The following addresses the substance of the Office Action.

Specification

The Abstract has been objected to for reciting the word "Said" in line 2. The Abstract has been amended accordingly.

Claim objections

Claims 1 and 5 have been objected to for the following informalities:

Claim 1 – the word "an" should be inserted after the word "as".

Claim 5 – the word "an" should be inserted before the word "electrolyte".

Claims 1 and 5 have been amended accordingly.

Definiteness

The Examiner has rejected Claims 1-18 under 35 USC §112, second paragraph as being indefinite. Specifically, Claim 1 was found indefinite for reciting "electrolytic coating" in line 7 without the word "the"; for not reciting the word "further" after the word "bath" in line 8; for not reciting the word "the" after the word "as" in line 12; for reciting the phrase "can be" in line 13. Claim 1 has been amended accordingly.

Claim 2 was found indefinite for not reciting the word "the" before "electrolyte" in line 2. Claim 5 has been found indefinite for not reciting the word "the" before "electrolyte" in line 3. Claim 6 has been found indefinite for not reciting the word "the" before "electrolyte" in line 2. Claim 9 has been found indefinite for not reciting the word "the" before "electrolyte" in line 3. Claims 2, 5, 6, and 9 have been amended accordingly.

Claim 10 has been found indefinite for not reciting the word "the" before "electrolytic coating" in line 2. Claim 11 has been found indefinite for not reciting the word "the" before "pretreatment" in line 2. Claim 12 has been found indefinite for not reciting the word "the" before "pretreatment" in line 2. Claims 16-18 have been found indefinite for not reciting the word "the" before "pretreatment" in line 1. Claims 10, 11, 12, and 16-18 have been amended accordingly.

Non-obviousness

The Examiner has rejected Claims 1-18 under 35 USC §103(a) as being allegedly unpatentable over DE 198 55 666 and Lehmkuhl et al. (USP 6,652,730) in combination with Dotzer et al. (USP 3,969,195). Lehmkuhl is an English equivalent of DE 198 55 666. Specifically, the Examiner indicated that it would have been obvious to a person with an ordinary skill in the art at the time this invention was made to have modified the method of Lehmkuhl by immersing the material in the electrolytic bath comprising the same electrolyte for pretreatment, wherein said material is connected as anode therein because pre-treating the electrically conductive materials disclosed in Lehmkuhl in an aprotic organoaluminum electrolyte medium would have anodically removed surface layers of oxide and/or scales where the material would have been provided with a tightly adherent, uniform layer of highly pure aluminum as taught by Dotzer. The Examiner further stated that it would have been obvious to a person with an ordinary skill in the art at the time this invention was made to have modified the pretreatment described by Dotzer wherein pretreatment is performed at an anodic load of the material with a current density of from 0.2 to 2 A/dm²; and wherein pretreatment is performed at an anodic load of the material with a current density of from 0.5 and 1.5 A/dm², because the current density is a result-effective variable and one skilled in the art has the skill to calculate the current density that would have determined the success of the desired reaction to occur, i.e., sufficient to remove the surface layers of oxide and/or scales. Applicants respectfully disagree.

To establish a *prima facie* case of obviousness a three-prong test must be met. First, there must be some suggestion or motivation, either in the references or in the knowledge generally available among those of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success found in the prior art. Third, the prior art must reference must teach or suggest all the claim limitations. *In re Vaack*, 947 F.2d 488 (Fed. Cir. 1991).

The presently claimed invention provides a method wherein aluminum, magnesium or aluminum/magnesium layers can be applied to materials, the quality of the metallic coating being increased by an improved pretreatment of the material. In particular, the improved pre-treatment is intended to prevent any new contamination or oxidation of the material. According to Dotzer et al. (the '195 patent), a method is known that allows pre-anodization and subsequent cathodic deposition to be carried out in one single bath. In this way, contamination and oxidation of the material is prevented. This method can be carried out successfully on beryllium and aluminum

materials in oxygen-free, moisture-free, aprotic and aluminum alkyl-containing electrolytes. However, for other materials, such as titanium, magnesium or zinc, the pre-treatment step and the coating step must be carried out in separate baths. This results not only in more labor and higher costs, but also in contamination of the electrolyte or oxidation of the materials.

The contribution made by the claimed invention is that of improving as only conditionally applicable method for carrying out pretreatment and deposition in one single electrolyte, so that the method can be applied to a broader group of materials. This was achieved by using an electrolyte that is modified with respect to the '195 patent. Such modified electrolyte corresponds to the electrolyte disclosed in the Lehmkuhl (col. 2, line 50 through col. 3, line 17; col. 3, lines 32-40 and col. 4, lines 9-18) for the deposition of aluminum or aluminum alloys, wherein the electrolyte contains $\text{Na}[\text{Et}_3\text{Al-H-AlEt}_3]$ or $\text{K}[\text{AlEt}_4]$, has additional $\text{Al}(\text{R}_3)$ and contains toluene or xylol as a solvent. The combination of the cited references is not obvious, and is surprising, since it cannot be deduced from these documents that when the electrolytes according to Lehmkuhl are used, it is possible to expand the group of materials that can be treated in a single bath.

The Lehmkuhl et al. (USP '730) describe an electrolyte suitable for the deposition of aluminum/magnesium alloy layer. The electrolyte described contains $\text{K}[\text{AlEt}_4]$ or $\text{Na}[\text{Et}_3\text{Al-H-AlEt}_3]$ and $\text{Na}[\text{AlEt}_4]$ and tetraalkylaluminum. Usually, the electrolyte is used in the form of a toluene solution and the electrolytic deposition is carried out by using a soluble aluminum anode and likewise a soluble magnesium anode or using an anode made of an aluminum/magnesium alloy. The document neither mentions anything about the pre-treatment procedure nor does it specify what kind of solution is used for the pre-treatment.

Dotzer et al. (US '195), in contrast to the '730 patent, describes the anodic pre-treatment of light metals for the electrodeposition of aluminum. The cleaning is carried out by treating the light metal materials in a fused electrolyte, thereby subjecting the material to anodic load. Col. 6, line 64 through col. 7, line 16 describe a pre-treatment method of aluminum articles by using an anodic surface pre-treatment. The reference points out that this can be carried out directly in the electroplating cell, and that the metal surface can be electroplated with aluminum by means of polarity reversal. However, the electrolyte used for the pretreatment is different from the presently claimed invention because the '195 patent describes the use of halogen containing

electrolytes for this purpose. The procedure described in the '195 patent has several disadvantages. Aluminum material which is cleaned as described in the cited reference is wetted with the electrolyte, which means that it is still loaded with fused electrolyte and immersed in an aluminizing cell. The possibility of oxygen still reaching the pretreated material and re-oxidizing on the substrate surface can not be excluded. Therefore, the aluminizing electrolyte is contaminated by the surface treatment electrolyte which is a fused electrolyte.

Only in those cases, where the material consists of aluminum, the fused electrolyte used in the surface treatment by anodic oxidation of the material can also be used in the electrodeposition of aluminum on the beryllium of aluminum material. However, the fused electrolyte described in the '195 patent is only suitable for the pre-treatment of beryllium or aluminum materials in order to effect subsequent coatings thereof with aluminum in the same fused electrolyte. The fused electrolyte described in the cited document is not suitable for the electro deposition of aluminum, magnesium or aluminum/magnesium layers on other materials. Col. 7, lines 17-29 describe the method of pretreatment in the case of Mg, Zn or Ti as a substrate. In this case, pretreatment is carried out separately before the electrodeposition with a separate treatment electrolyte, i.e., a mixture of $\text{Na}[\text{Al}(\text{C}_2\text{H}_5)_4]$ and $\text{K}[\text{Al}(\text{C}_2\text{H}_5)_4]$. However, this electrolyte is not suitable for a magnesium or Al/Mg coating of the substrate.

The electrolyte described in the '195 reference comprises halogenides. Such halogenides can not be used for magnesium, aluminum/magnesium alloys or zinc substrates because halide-containing electrolytes react with magnesium, zinc or aluminum/magnesium alloys by building up layers of halogenides (MgF or ZnF_2), on the surface. Thus, a pretreatment is not possible and the halogenide layers cannot be further coated. This is explicitly described in the '195 patent, in col. 6, lines 43-52. Thus, the methods described in the cited references are not suitable for the metal coating of magnesium, aluminum/magnesium alloys or zinc substrates.

For all these reasons, Claims 1-18 are non-obvious over the cited references, and their rejection under 35 USC §103(a) should be withdrawn.

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CONCLUSION

Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of the above amendments and remarks, reconsideration and withdrawal of the outstanding rejections is specifically requested. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully requested to initiate the same with the undersigned.


Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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